

SHOCK ABSORBING CARPET SYSTEM

Cross-Reference to Related Applications: This is a Continuation in Part of co-pending patent application Serial Number 08/971,524, filed 11/17/97.

Background of the Invention:

Related Prior Art

In U.S. Patent 5,658,430 issued to Drake and Herrin in 1997 there is illustrated new wall to wall carpeting applied directly over worn carpeting having a backing secured to a hard floor surface, by spraying an adhesive onto the top pile surface of the old carpet.

In U.S. Patent 4,647,484 issued to Higgins in 1983 there is illustrated an underlay for carpets having a scrim supported lower foam rubber portion and a Mylar® upper portion having adhesive on both sides to provide an attachment to the lower portion and an adhesive upper portion for attachment to a carpet tile. The upper portion is protected by a release paper, which is removed before installation.

In U.S. Patent 5,304,268 issued to Hoopengardner in 1994 there is illustrated a carpet pad having a pressure sensitive adhesive for retaining the carpet and pad in place on a floor.

In U.S. Patent 4,990,399 issued to Hoopengardner in 1991 there is illustrated a carpet cushion of compressible foam having a pressure sensitive adhesive applied for retaining the carpet and pad in place on a floor, and having a spacer element laid into the adhesive after the adhesive is applied.

In U.S. Patent 4,804,567 issued to Reuben in 1989 there is illustrated an automobile carpet having a carpet pad attaching means removably connected by a pressure sensitive adhesive.

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Brief Summary of the Invention:

A carpet assembly with shock absorbing properties for preventing injury comprising a mat of closed cell foam composition having shock damping properties and having a top side and a bottom side and predetermined thickness and perimeter edges connecting the top side and the bottom side; a layer of adhesive which may be pressure sensitive adhesive covering the top side of the mat, a layer of carpet having a top side and a bottom side, the bottom side of the carpet being fastened in contact with the an adhesive which may be pressure sensitive adhesive for adherence thereto. Preferably, the mat is substantially 1 1/8 inch thick. The present invention is directed to the problem of safety in the design of flooring where people are likely to fall down, such as, playgrounds, child care centers, gymnasiums, and the like. These areas often require portability of such flooring systems, size variation, and reconfiguration of the shape of the system, as the nature of the events may demand. The present invention may be installed wall to wall or as a portable system to cover only an area as required for an activity such as gymnastics. By incorporating a mat with an impact attenuation that satisfies ASTM F-1292-99, the present invention provides a safe flooring system for a variety of applications where people are likely to fall down. The present invention eliminates undesirable wicking of the adhesive and the need for intermediate sealing systems, by using a closed cell carpet mat, which allows direct application of the adhesive.

Brief Description of the Drawings:

FIG. 1 is a cross-sectional view of a shock absorbing carpet mat assembly formed in accordance with this invention.

FIG. 2 is a top view of a shock absorbing carpet mat assembly showing multiple sections attached together in accordance with this invention.

FIG. 3 is a partial cross section view of a shock absorbing carpet mat assembly of 1-1/2 inch thick mat with a tapered edge on the mat.

FIG. 4 is a partial cross section view of a shock absorbing carpet mat assembly of 5/8 in thick mat with a tapered edge on the mat.

FIG. 5 is a partial cross section view of a shock absorbing carpet mat assembly of 1-1/2 in thick mat with a tapered edge on the mat and showing a hook and loop fastening system to anchor the mat assembly.

Detailed Description:

The American Society for Testing and Materials has issued ASTM F-1292-99 Standard Specification for Impact Attenuation of surface Systems Under and Around Playground Equipment. This specification limits the maximum impact force to 200 times the force of gravity, from a specified height. My carpet mat assembly in the preferred embodiment limits a fall from 48 inches to the specified impact limit. Applications of carpet mats need to be adapted to the potential fall distance of a person walking on the mat, or on top of any equipment above the mat.

FIG. 1 is a cross-sectional view of a shock absorbing carpet mat assembly 1. The assembly includes a mat section 2 made of a closed cell material. In the preferred embodiment, mat section 2 has a thickness of 1 1/8" or other as necessary to meet ASTM F-1292-99. Variations in density and hardness of the mat, however, may allow a mat as thin as 1/2". I believe that with present materials, the mat should be at least 1/2" thick. In the preferred embodiment, mat section 2 is made in sections 4' x 6'. The top side 3 of the mat section 2, is coated with a layer of adhesive 4. Prior to assembly, if pressure sensitive adhesive is used, the pressure sensitive adhesive 4 is covered with a removable liner (not shown) on the side opposite the mat section 2 to protect the pressure sensitive adhesive 4 from contact with any other surface during shipping and handling. The removable liner is removed to expose the surface of the pressure sensitive adhesive 4 prior to installation of the carpet 5. To install the carpet 5, the bottom side of the carpet 6 is place in direct

contact with the adhesive 4 and bonded thereto. The perimeter edges 7 of the mat section 2 may have a hook and loop fastener such as 3M Velcro® 8 attached. The hook and loop fastener 8 allows easy attachment of other mat sections to create a larger, removable, protective floor surface. The hook and pile fastener such as 3M Velcro® 8 also allows attachment of edge molding 9. The edge molding 9 provides a perimeter of the shock absorbing carpet mat assembly 1 that is both aesthetically appealing and protective. Alternatively, edge molding 9 can be permanently attached to mat section 2 and carpet 5, with a contact cement or other adhesive.

FIG. 2 is a top view of a shock absorbing carpet mat assembly 1 showing multiple sections 10 attached contiguously together. The sections are attached by means of the hook and pile fastener such as 3M Velcro® 8 along the perimeter edges 7 of each mat section 2. If the multiple sections 10 do not complete a carpet assembly that is wall to wall in a room, the outside edge 11 of the multiple sections 10 can have edge molding 9 attached, preferably with contact cement. Preferably the edge molding is of closed cell foam, similar or identical to the mat 2. Preferably, a hook and pile fastener such as 3M Velcro® is affixed to at least one perimeter edge of each individual assembly for detachably attaching multiple sections of the carpet mat assembly into a unit.

FIG. 3 is a partial cross section view of a shock absorbing carpet mat assembly of 1-1/2 inches thickness mat with a tapered edge on the mat. Mat 12 is 1-1/2 inches thick. Carpet 14, can be made liquid proof by the application of a liquid polyurethane to the bottom side, then a woven cloth is applied over the polyurethane. The treated bottom side of the carpet is glued by any suitable glue to the mat 12. The width of the taper illustrated is 7 inches. Tests have shown that the closed cell foam mat of 1-1/2 inch thickness will conform to the ASTM F-1292-99 Standard Specification for Impact Attenuation of surface Systems Under

and Around Playground Equipment for a 72 inch fall. I have found that a 7 inch width of taper to 1-1/2 in thickness to be a 4.67 ratio which is a good thickness to width ratio for the edge taper for a mat assembly. It is a gentle enough taper to reduce unexpected contact with the carpet when walking onto the edge of the carpet assembly. This width preferably is between 4 and 5 times the thickness, although it may vary between 1 and 12 times the thickness.

FIG. 4 is a partial cross section view of a shock absorbing carpet mat assembly of 5/8 in thick mat with a tapered edge on the mat. Mat 18 is 5/8 inches thick. Carpet 20, can be made liquid proof by the application of a liquid polyurethane (not shown) to the bottom side, then a woven cloth (not shown) is applied and adhered to the polyurethane. The treated bottom side of the carpet is glued by any suitable glue to the mat 18. Tests have shown that the closed cell foam mat of 5/8 inch thickness will conform to the ASTM F-1292-99 Standard Specification for Impact Attenuation of surface Systems Under and Around Playground Equipment for a 24 inch fall. The width illustrated of the taper is 3 inches for the 5/8 inch thick mat. I have found that a 3 inch width of taper to 5/8 inch thickness to be a 4.80 ratio which is a good width to thickness ratio for the edge taper for a mat assembly. It is a gentle enough taper to reduce unexpected contact with the carpet when walking onto the edge of the carpet assembly. This width preferably is between 4 and 5 times the thickness, although it may vary between 1 and 12 times the thickness.

FIG. 5 is a partial cross section view of a shock absorbing carpet mat 24 assembly of 1-1/2 in thick mat with a tapered edge on the mat and showing a hook and loop fastening system to anchor the mat assembly. In this preferred method, a carpet assembly as described in Figures 3 or 4 may be secured to a floor in an easy and convenient fashion. A hook and loop fastener system such as 3M Velcro® with a pressure sensitive adhesive on the outer

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surfaces of the fastener portions is utilized. The hook and loop fastener portions are assembled in mating and aligned relationship. The hook portion 24 of fastener is adhered to the bottom side of the mat in carpet assembly 34 in the location illustrated by arrow 28. The hook portion 24 of fastener may be adhered to the bottom side of the mat in carpet assembly 34 with pressure sensitive or other adhesive. The loop portion 26 of the hook and loop fastener is matingly positioned in engagement with hook portion 24. Then the carpet assembly is placed in the position where it is desired to be affixed as illustrated by arrow 32. The protective film 36 is removed from the loop portion of the fastener system and the mat is affixed to the floor. Foot pressure may be used to insure adherence of the loop portion to the floor. Then the carpet assembly may be removed, leaving the relatively smooth loop portion of the fastener system in place on the floor. The carpet assembly may then be repositioned and held at the same location on the floor.

I am disclosing a carpet assembly with shock absorbing properties for preventing injury comprising; a mat of closed cell foam composition having shock damping properties and having a top side and a bottom side and predetermined thickness and perimeter edges connecting said top side and said bottom side; a layer of adhesive which may be pressure sensitive adhesive covering the top side of the mat, a layer of carpet having a top side and a bottom side, the bottom side of the carpet being fastened in contact with the pressure sensitive adhesive for adherence thereto. I am further disclosing a carpet mat assembly having a removable liner covering a pressure sensitive adhesive on the top side of the mat to protect the pressure sensitive adhesive from contact with any other surface, prior to fastening the carpet to the mat.

Although the taper illustrated in Figures 3, 4 and 5 have a straight line profile, for the purposes of this specification, taper includes variations from the straight line comprising convex curves, concave curves, combinations of these curves and combinations of these

curves with straight line elements.

Although elements of the invention have been illustrated in the accompanying drawings and described in the foregoing description it will be understood that the invention is not limited to the embodiments disclosed, but is capable of rearrangements, modifications, substitutions and reversals of parts and elements without departing from the spirit of the invention.

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